



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 :

G06F 15/21

A1

(11) International Publication Number:

WO 92/14213

(43) International Publication Date:

20 August 1992 (20.08.92)

(21) International Application Number: PCT/US92/01006

(22) International Filing Date: 6 February 1992 (06.02.92)

(30) Priority data:

652,324

6 February 1991 (06.02.91)

US

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(81) Designated States: AU, BB, BG, BR, CS, FI, HU, JP, KP, KR, LK, MG, MW, NO, PL, RO, RU, SD.

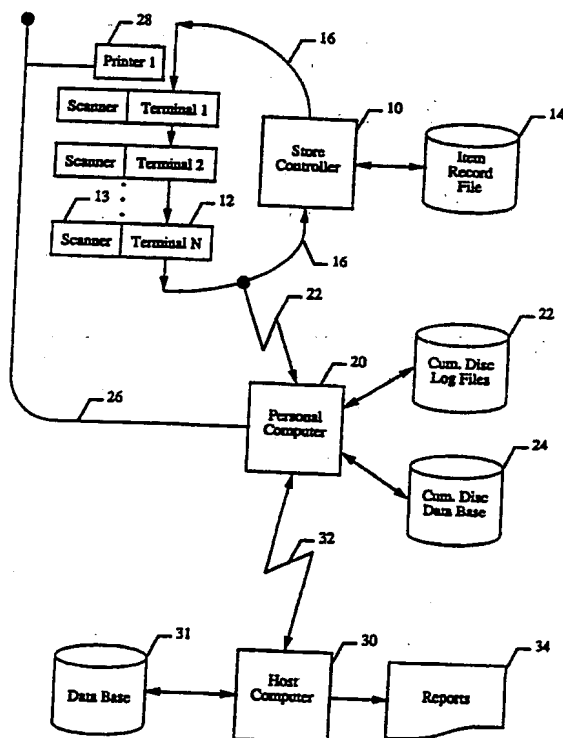
Published

With international search report.

(54) Title: METHOD AND APPARATUS FOR GENERATING CUMULATIVE DISCOUNT CERTIFICATES

## (57) Abstract

Apparatus and method for creating a cumulative discount certificate in response to the purchase of multiple discountable products in a retail customer order. A record pertaining to each item purchased is examined to determine whether the item is intended to be subject to a discount. If it is, the terms of the discount are accumulated until the end of the customer order, at which time a cumulative discount certificate will be printed (28) for all of the qualifying items. Printing may be inhibited based on selected conditions, such as the total dollar amount of the order. The apparatus is implemented principally in software form in personal computer (20), which is coupled to check-out scanners (13), cumulative discount files (22, 24) and host computer (30).



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METHOD AND APPARATUS FOR  
GENERATING CUMULATIVE DISCOUNT CERTIFICATES

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BACKGROUND OF THE INVENTION

This invention relates generally to point-of-sale computer systems of the type used in retail stores to record sales transactions. More particularly, the invention relates to point-of-sale systems capable of handling discount coupons. Most point-of-sale systems have terminals that are capable of reading a code printed on each product package, and thereby determining the price from an internal file that is accessed by a store controller. Products are coded by means of a series of parallel lines, in accordance with a convention known as the Universal Product Code.

As every grocery shopper knows, many manufacturers distribute discount coupons for their products, either through the mail, or by printing them in newspapers or magazines, or enclosing them in similar or related product packages. When a customer presents a discount coupon at the time of purchase of an appropriate product, the grocery checker operating the terminal will typically key in the coupon amount, and the discount will be subtracted from the customer's bill.

This procedure often has the disadvantage that the customer may not have actually purchased the discountable product, and the coupon will then be improperly redeemed. A further disadvantage, from a customer

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standpoint, is that collecting coupons and taking them to the store is inconvenient, and many customers simply do not participate in any promotional program involving distributed coupons. This represents a significant loss  
5 for the manufacturers or retailers that distribute the coupons.

In related United States Patent Nos. 4,910,672 and 4,723,212, systems are disclosed for generating printable discount coupons at a checkout counter, as a  
10 result of the purchase of one or more "triggering" products. A customer may then be presented with a discount coupon for use on a subsequent visit. This technique has proved to be very successful in distributing single discount coupons in response to the purchase of select-  
15 ed products or groups of products, but does not address other important marketing goals of retailers.

Retailers have been trying various marketing strategies to gain customer loyalty and continuity. One approach is to issue identification cards to customers  
20 and to reward a customer based on frequency of use of the card. Difficulties with this type of scheme are customer resistance to obtaining, carrying and using the card, and overhead costs in signing up customers and making the cards. Product manufacturers also have a  
25 need for a promotional program that develops customer loyalty, but also without the overhead associated with conventional coupon distributions. A manufacturer offering a discount on a product, or line of products, would like to be sure that each product for which a  
30 discount coupon is distributed and redeemed is actually purchased, but this is not always the case with conventional discount coupons, since they may be improperly redeemed, or simply never redeemed.

It will be appreciated from the foregoing that  
35 there is a need for further improvement in the field of

automatic distribution of coupons or discount certificates. Ideally, it would benefit consumers, retailers and manufacturers if there were some way to automatically reward the purchase of a variety of selected products, to ensure purchase of the discounted products, to permit a large number of consumers to participate without signing up for discount clubs or identification cards, and to encourage consumers to revisit the same store. The present invention satisfies all these needs, as will be appreciated from the following summary.

#### SUMMARY OF THE INVENTION

The present invention resides in a method and apparatus for automatically generating, in a retail store, a printable cumulative discount certificate that includes discounts for multiple products purchased in a single order, the certificate being redeemable on a subsequent visit to the store. Briefly, and in general terms, the method of the invention includes the steps of preselecting multiple discountable products for which a cumulative discount certificate may be printed, identifying each discountable product in a customer order, retrieving the terms of a discount associated with the discountable product, and generating a printable discount certificate that contains an accumulation of all of the discountable products identified in the customer order.

More specifically, the step of generating a discount certificate includes creating a discount certificate list in which each entry corresponds to a different discountable product identified in the customer order, adding to the list when a discountable product is identified that does not already have an entry in the list, and incrementing an item count in the list

when a discountable product is identified that already has an entry in the list. The method further comprises the steps of detecting the end of the customer transaction, determining whether any item in the list should  
5 be excluded from the printed discount certificate, and forming a printable image of the discount certificate from the qualifying entries in the list.

The method further comprises the steps of printing the printable image of the discount certificate, and maintaining a log of printed discount certificates. When the customer returns to the store to redeem  
10 the certificate, the method further comprises the step of processing the redemption of the cumulative discount certificate. Processing the redemption may include maintaining a log of redeemed certificates, and applying  
15 the amount of the discount in the certificate to a customer order.

In terms of apparatus, the invention comprises a plurality of terminals at customer checkout locations, each having means for reading product codes on  
20 purchased items in a customer order; a store controller with which the terminals can communicate, the store controller having access to an item record file containing price and other information for each product item;  
25 means for storing the terms of multiple product discounts that are subject to accumulation on a single discount certificate; means for identifying triggering products in the customer order; and means for automatically generating a printable discount certificate, containing accumulated discounts relating to all of the  
30 triggering products identified during processing of a customer order. The apparatus also includes means for printing the discount certificate for immediate customer distribution, and means for inhibiting printing of  
35 the discount certificate if the customer's total pur-

chase is below a preselected threshold.

More specifically, the means for automatically generating a printable discount certificate includes means for creating a discount certificate list containing an entry for each discountable triggering product identified in the customer order, and means for incrementing an item count upon subsequent identification of a triggering item for which an entry already exists in the list. The means for generating the printable discount certificate further includes means responsive to detection of the end of a customer transaction, for determining whether any items on the list should be excluded from printing, and for generating the printable certificate from qualifying items on the list.

The apparatus of the invention also preferably includes means for processing redemption of a printed discount certificate in a subsequent customer order, and applying an accumulated discount to the subsequent customer order, and means for maintaining a log of cumulative discount certificates printed and cumulative discount certificates redeemed.

It will be appreciated from the foregoing that the present invention represents a significant advance in the field of automatic generation of discount coupons and certificates at the point of sale of retail products. In particular, the invention provides a convenient method for the generation of a cumulative discount certificate that is redeemable on a subsequent visit to the store. The cumulative discount certificate avoids many of the problems associated with conventional discount coupons and with coupons for specific products or manufacturers. Other aspects and advantages of the invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a simplified block diagram showing the apparatus of a point-of-sale computer system incorporating the present invention for use in a retail store;

FIG. 2 is a flowchart showing the functions performed in a general wait state processing loop, in accordance with the method of the invention;

FIG. 3 is a flowchart showing the functions performed in processing input data and generating printable discount certificates in accordance with the method of the invention; and

FIG. 4 is a flowchart showing the functions performed in processing output data in accordance with the method of the invention.

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DESCRIPTION OF THE PREFERRED EMBODIMENTOverview:

As shown in the drawings for purposes of illustration, the present invention is concerned with point-of-sale systems for recording sales transactions involving discount coupons or certificates. FIG. 1 shows in broad outline the components of such a system. In each store in which the invention is to be used, there is a store point-of-sale controller, indicated by reference numeral 10, and a plurality of checkout terminals 12, each having an associated optical scanner 13. Associated with the store controller 10 are a number of files, one of which is an item record file, indicated at 14, and these files are used by the controller to provide information to the terminals 12. The item record file 14 contains a record for each product sold in the store, and is used to access price and other information concerning the product.

In a typical store installation, the terminals 12 and the store controller are connected together in ring bus configuration, known as the terminal processing loop, indicated at 16. Communication between the store controller 10 and the terminals 12 is made over the terminal processing loop 16.

The components described thus far, including the store controller 10, the terminals 12, the item record file 14, and the terminal processing loop 16, together constitute a conventional retail point-of-sale system. In accordance with the invention, transactions taking place at the terminals are monitored to detect the sale of preselected triggering products, and printable cumulative discount certificates are generated as required. The invention is implemented principally in software form in a personal computer 20, which is cou-

pled to the terminal processing loop 16, as indicated by line 22, in such a manner that the personal computer appears to the store controller 10 to be another terminal.

5 Associated with the personal computer 20 are two file systems: a cumulative discount data base 24 and cumulative discount log files 26. The personal computer 20 detects the purchase of triggering products at the terminals 12, retrieves the terms of each discount  
10 deal from the cumulative discount data base 24, generates printable discount certificates, and logs each discount certificate in the log files 22. The personal computer 20 also controls printing of the cumulative discount certificates, through a printer output bus 26,  
15 which is connected to a printer at each terminal 12, one of the printers being shown at 28.

The personal computer 20 is also coupled to a retailer host computer 30, as indicated by line 32, which may be a telephone line or some other communication link. The retailer host computer 30 controls communications with all store controllers in the retailer's various stores, and is responsible for generating various accounting reports, as indicated at 34. The retailer host computer 30 has an associated data base 36 of  
20 various files relating to the retailer's entire store operations.

The item record file 14 is a standard price file used in point-of-sale systems, except that it includes a trigger flag, which is an additional one-bit  
30 field. The record format of this file is shown in more detail in United States Patent Nos. 4,910,672 and 4,723,212. In the process of coupon creation, the file 14 is accessed to determine if a product being purchased is a triggering product. If so, a corresponding  
35 record is retrieved from the cumulative discount data

base 24. This provides additional information about the discount deal that is in effect for this particular product, specifically the amount of the discount. Instead of immediately creating a discount coupon, however, the method of the invention accumulates the discount with any others detected in the same customer order. Then, at the end of the customer transaction, a cumulative discount certificate is generated and printed. Basically, the discount certificate provides a cumulative cash discount to be applied to another order when the customer returns the certificate to the store on a subsequent visit. These operations will now be discussed in further detail.

15 Certificate creation and redemption:

The coupon creation functions performed by the apparatus of the invention are shown in FIGS. 2, 3 and 4. FIG. 2 illustrates a "general wait state" of processing performed in the personal computer 20, which involves cyclic checking to determine whether any specific processing task needs to be performed. Once processing is initiated to a certain stage, a return is made to the general wait state, as will be further explained. For purposes of explanation, the processing steps performed by the invention are depicted as involving a transaction at a single terminal. It will be understood, however, that the personal computer 20 provides effectively simultaneous processing for all of the terminals 12, but to illustrate processing for multiple terminals would render the flowcharts unduly complicated.

The general wait state processing loop shown in FIG. 2 includes a series of four decision blocks 40-43. In block 40, the computer 20 determines whether there is any input data to process. Input data is ei-

ther from a terminal bar code scanner (not shown), or from a terminal keyboard (not shown). If there is input to process, the computer 20 enters an input processing sequence, shown at 44 and, in more detail, in FIG. 3.

- 5 In block 41, the computer determines whether there is any output to process. If so, an output processing sequence is entered, as indicated at block 46 and, in more detail, in FIG. 4.

Block 42 in the general wait state processing  
10 loop determines whether any response has been received from a prior request made to the controller 10 for file access. As will become apparent, the computer 20 makes a number of requests for file access but, because gaining access to a file may take a relatively long time,  
15 processing continues in the general wait state loop until a response to the request is received. Then a response return is made, as indicated at 48, which simply means that control is transferred back to a point in the program at which the file access request was made,  
20 so that the program can continue in its proper sequence. Finally, decision block 43 in the general wait state loop determines whether a time-out is complete. In some point-of-sale systems, printing of cumulative discount certificates may be accomplished without a completely separate printer for that purpose. There may be  
25 a separate print station for printing the certificates, but the print head may be shared by other printing functions, such as customer receipt printing. In this case, it may be necessary to avoid having the printing of so  
30 many discount certificates (and possibly other types of discount coupons) that other printing functions are precluded. Therefore, the printing of a discount certificate, or of a substantial part of the certificate, can be followed by a request for a time-out, to allow other  
35 printing functions to gain access to the printer. Until

the time-out is complete, as determined in block 43, processing remains in the general wait state loop. When the time-out is complete, a time-out return is made, as indicated in block 50, to continue processing at the point from which the time-out was requested.

FIG. 3 shows the input processing sequence 44 in more detail. First, in block 52, the input data is examined to determine whether it is redemption data. Each printed discount certificate will have a special bar code that can be read at the checkout counter, and distinguished from the Uniform Product Codes that identify products. If the input is not redemption data, it is next checked, in block 54, to determine if it is Uniform Product Code (UPC) data. If so, a record corresponding to the UPC in the input data is retrieved from the item record file 14 (FIG. 1), and is checked to determine whether the item is one that should trigger the generation of a cumulative discount certificate, as indicated in block 56. If the item is not one that has been preselected to trigger generation of a certificate, no further processing is needed for this item and a return is made to the general wait state, as indicated at 58. If the item is a triggering item, a corresponding record is retrieved from the cumulative discount data base 24 (FIG. 1), as indicated in block 60. The succeeding processing steps generate a cumulative discount (CD) list for the customer order presently being processed. If the item being processed is not already in the list, as determined in decision block 62, it is placed in the list, as indicated in block 64. If the item is already in the list, the number of purchases of this item is incremented, as indicated in block 66, and a return is made to the general wait state processing loop, as indicated at 58. Repeated processing of data corresponding to purchased items, in blocks 54

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through 66, results in the generation of a discount list from which a certificate may be printed. This list is stored internally in the computer 20 until the end of the customer transaction, as indicated by the "tender" state of the checkout keyboard.

When the customer tenders payment for the order, the operator actuates a "tender" key to terminate the transaction and open a cash drawer at the checkout counter. The actuation of the tender key is detected as indicated in decision block 68. Prior to actuation of the key, processing proceeds from block 68 to the general wait state loop, as indicated at 58. Once the tender key has been detected, the cumulative discount list is examined to determine if it contains any items, as indicated in block 70. If the list is empty, return is made to the general wait state loop, via block 58. If the list contains one or more items, a decision is made as to whether a cumulative discount certificate should be printed, as indicated in block 72. This decision can be based on one or more desired criteria, such as whether items totalling to a minimum dollar amount have been purchased. If the criteria have not been met, the cumulative discount list for the transaction is cleared, as indicated in block 74, and return is made to the general wait state processing loop, via block 58. If the desired criteria are met, as determined in decision block 72, a printable cumulative discount certificate is generated, as indicated in block 76, and is placed in a print queue, as indicated in block 78, before clearing the list (block 74) and returning to the general wait state loop via block 58.

Printing the certificate is accomplished with the steps of output processing 46, as shown in more detail in FIG. 4. Basically, output processing involves three steps: printing a certificate from the print

queue, as indicated in block 80, removing from the print queue an entry corresponding to the printed certificate (block 82), and logging the printing of the certificate (block 84) in the cumulative discount certificate log files 22 (FIG. 1). Then a return is made to the general wait state processing loop, via block 58. If other certificates remain to be printed, they will be retrieved from the print queue on a subsequent return to these output processing steps.

The only aspect of the invention not yet discussed is certificate redemption. Each printed cumulative discount certificate is redeemable on a subsequent visit to the store. When the certificate is presented, the checkout counter operator scans a bar code on the certificate and this action generates input data to the personal computer 20 (FIG. 1). Input data relating to redemption is recognized, as indicated in decision block 52 (FIG. 3), and the redemption is logged, as indicated in block 86 of FIG. 3. Logging redemptions involves two basic functions: maintaining a cumulative record of certificates that have been redeemed, in the files 22 (FIG. 1), and applying the discount to the customer order.

#### 25 Hardware and Software Overview:

As mentioned earlier, the computer 20 is a personal computer, utilizing a microprocessor chip such as the Intel 80386. Software for performing the functions described above may run under a conventional operating system for such a computer, such as the Microsoft Disk Operating System (MSDOS). The functions described can be programmed in any desired manner or language.

Some details of the software will be dependent on the point-of-sale hardware with which the software must interface in obtaining data from the terminal pro-

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cessing loop (16, FIG. 1). Distinctly different interface programs will be needed to adapt the invention of operation with either IBM, Datachecker, NCR or Sweda point-of-sale systems, but the specification of these  
5 interfaces are design details not critical to the invention.

Summary of Advantages:

It will be appreciated from the foregoing that  
10 the present invention provides significant advantages over prior systems for automatically generating discount coupons. The principal advantage of the invention is its simplicity. No special customer cards are needed, and no customer participation other than in elect-  
15 ing to buy specially advertised triggering products. The advertising can be in the store, so that coupon distribution problems are totally avoided and all customers entering the store are potential participants in the discount program. Even customers who are unaware of  
20 the in-store advertising may unknowingly become participants in the program. From the retailer standpoint, the scheme is ideal because of its simplicity and flexibility. The discounts are paid for by manufacturers; there are no mailing costs; large numbers of customers are in-  
25 volved and given incentive to return to the store; the redemption process is simple and efficient; and the program is easy to implement, modify, or discontinue. From the manufacturer's perspective, the invention is also attractive, in that it avoids coupon distribution  
30 costs; involves large numbers of customers; guarantees the purchase of every product to which a discount is applied (no improper redemptions); and can be administered easily and over a shorter time period than conventional coupons.

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An important aspect of the invention is that the discount certificate it produces is a cumulative one, and may include discounts for different products and different manufacturers on the same certificate.

5 The total discount amount is typically the most important aspect of the program for a customer, but this dollar total is usually difficult to ascertain in a conventional discount coupon environment. With the cumulative discount certificate, the customer is made more aware

10 of the advantages of buying the promoted products, all of which are listed on the certificate. Although these products may be from various manufacturers, a retailer may also, in conjunction with manufacturers, operate a promotional program in which one or more groups of manu-

15 facturer's products are featured, to foster customer awareness of the selected groups of products.

Although an embodiment of the invention has been described in detail for purposes of illustration, various modifications may be made without departing

20 from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.

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CLAIMSWe claim:

1. A system for generating a printable cumulative discount certificate in a retail store, solely in response to a customer's decision to purchase one or more preselected items, the system comprising:

5 a plurality of terminals at customer checkout locations, each having means for reading product codes on purchased items in a customer order;

a store controller with which the terminals can communicate, the store controller having access to  
10 an item record file containing price and other information for each product item;

means for storing the terms of multiple product discounts that are subject to accumulation on a single discount certificate;

15 means for identifying triggering products in the customer order; and

means for automatically generating a printable discount certificate, containing accumulated discounts relating to all of the triggering products identified  
20 during processing of the customer order.

2. A system as defined in claim 1, and further comprising:

means for printing the discount certificate for immediate customer distribution.

3. A system as defined in claim 2, and further including:

means for inhibiting printing of the discount certificate if the customer's total purchase is below a  
5 preselected threshold.

4. A system as defined in claim 1, wherein the means for generating the printable discount certificate includes:

means for creating a discount certificate list  
5 containing an entry for each discountable triggering product identified in the customer order, including means for incrementing an item count upon subsequent identification of a triggering item for which an entry already exists in the list.

5. A system as defined in claim 4, wherein the means for generating the printable discount certificate further includes:

means responsive to detection of the end of a  
5 customer transaction, for determining whether any items on the list should be excluded, and for generating the printable certificate from qualifying items on the list.

6. A system as defined in claim 1, and further comprising:

means for processing redemption of a printed discount certificate in a subsequent customer order,  
5 and applying an accumulated discount to the subsequent customer order.

7. A system as defined in claim 1, and further comprising:

means for maintaining a log of cumulative discount certificates printed and cumulative discount cer-  
5 tificates redeemed.

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8. For use in a retail store point-of-sale system having a plurality of terminals at customer check-out locations, each with means for reading product codes on purchased items in a customer order, a method  
5 for generating a printable discount certificate, the method comprising the steps of:

preselecting multiple discountable products for which a cumulative discount certificate may be printed;

10 identifying each discountable product in a customer order;

retrieving the terms of a discount associated with the discountable product; and

generating a printable discount certificate  
15 that contains an accumulation of all of the discountable products identified in the customer order.

9. A method as defined in claim 8, wherein the step of generating a discount certificate includes:

creating a discount certificate list in which each entry corresponds to a different discountable product identified in the customer order;  
5

adding to the list when a discountable product is identified that does not already have an entry in the list; and

incrementing an item count in the list when a  
10 discountable product is identified that already has an entry in the list.

10. A method as defined in claim 9, and further comprising the steps of:

- detecting the end of the customer transaction;
- determining whether any item in the list
- 5 should be excluded from the printed discount certificate; and
- forming a printable image of the discount certificate from only qualifying entries in the list.

11. A method as defined in claim 10, and further comprising the steps of:

- printing the printable image of the discount certificate; and
- 5 maintaining a log of printed discount certificates.

12. A method as defined in claim 11, and further comprising the step of:

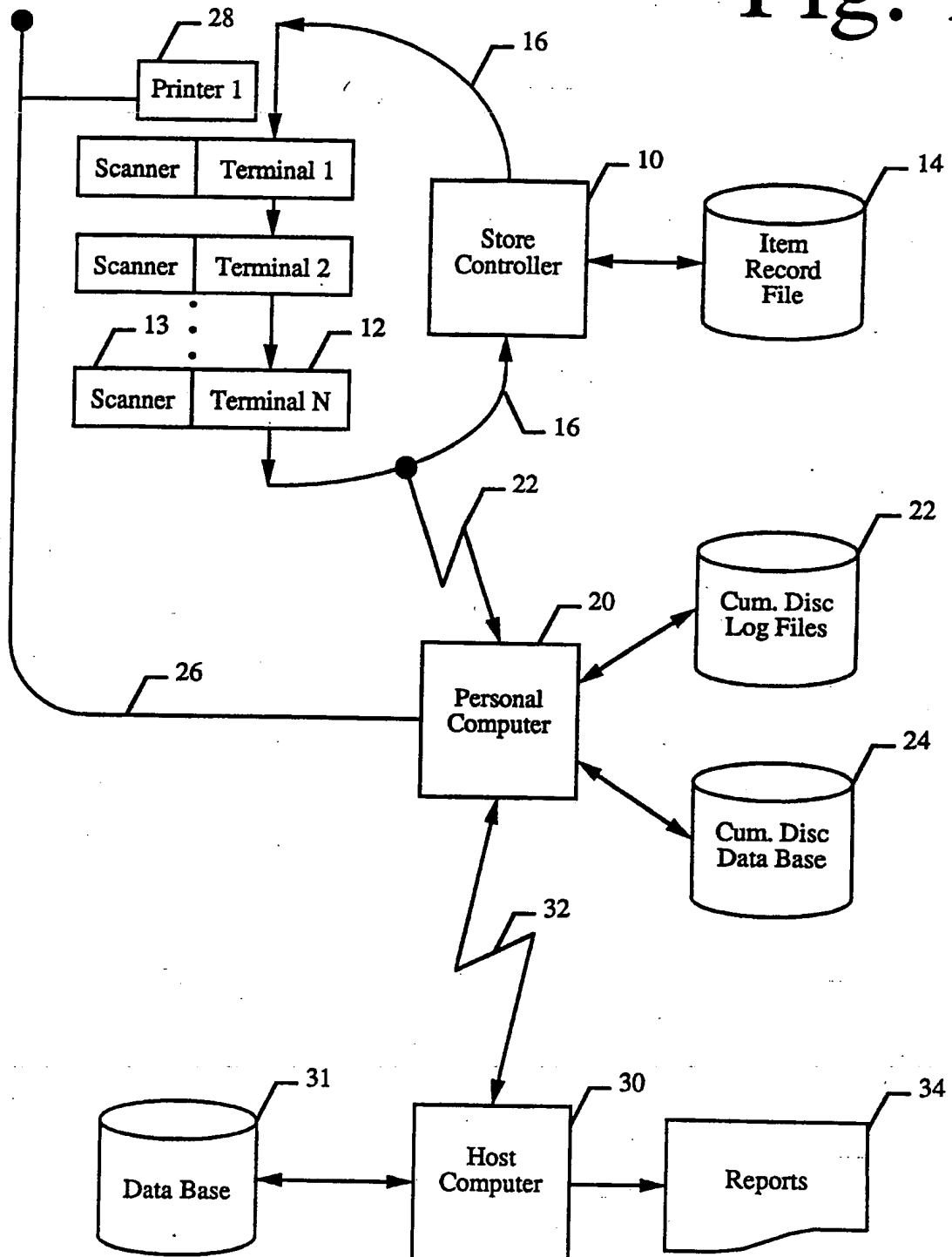
- processing the redemption of a cumulative discount certificate.

13. A method as defined in claim 11, wherein the step of processing the redemption includes:

- maintaining a log of redeemed certificates;
- and
- 5 applying the amount of the discount in the certificate to a customer order.

1/3

Fig. 1

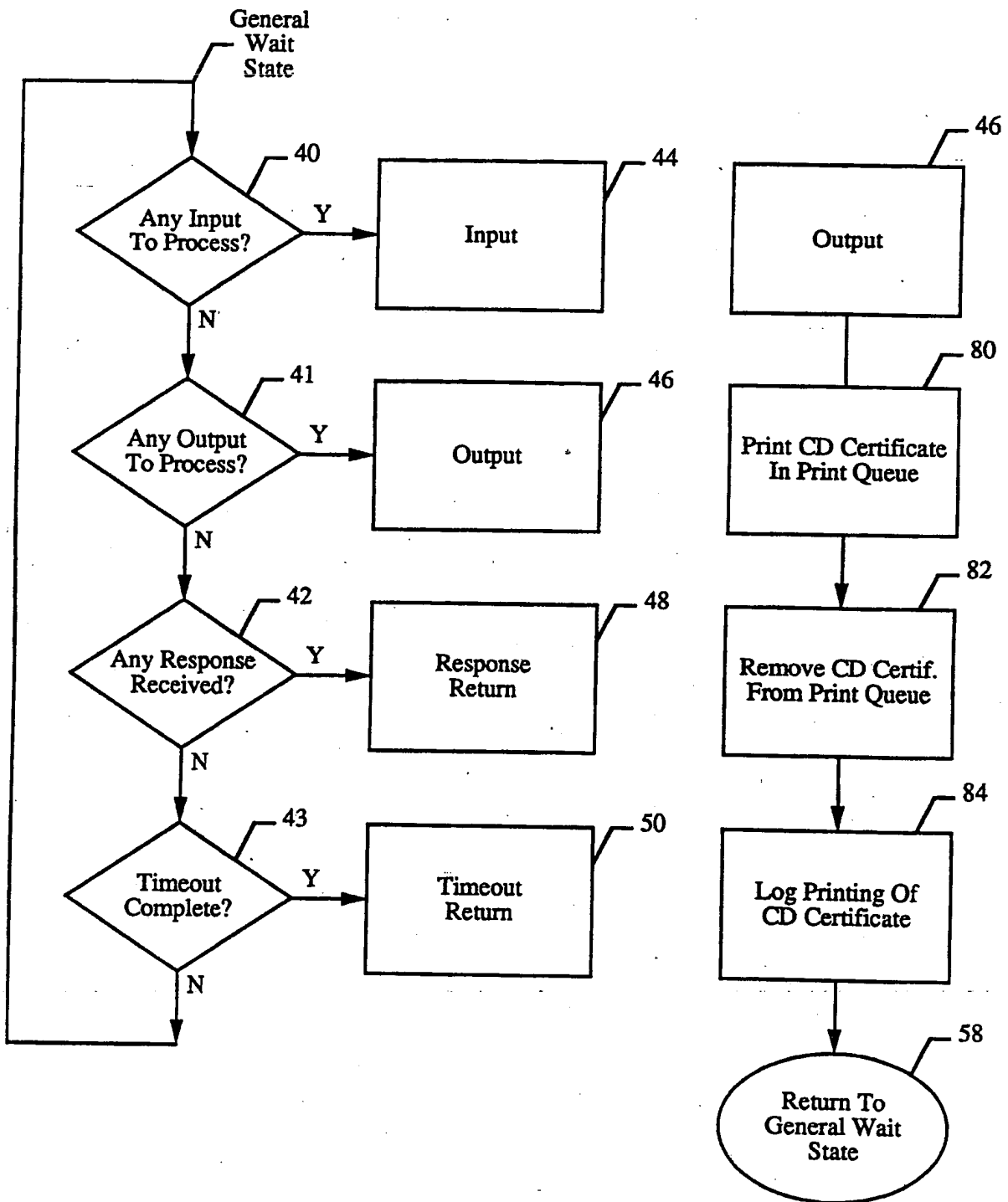


SUBSTITUTE SHEET

2/3

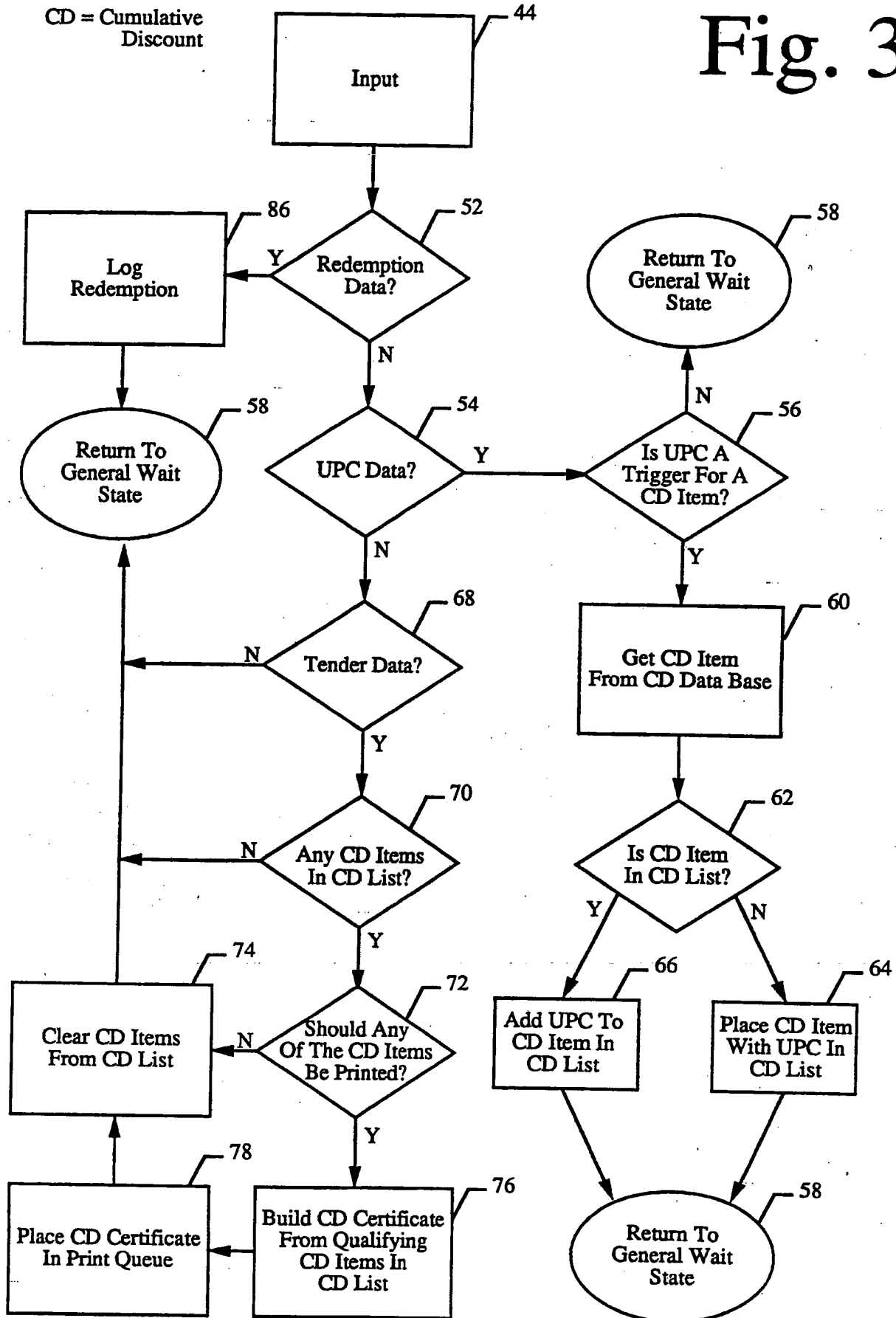
Fig. 2

Fig. 4

CD = Cumulative  
Discount

3/3

Fig. 3





# INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US92/01006

## I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) \*

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC(5): G06F 15/21

U.S. CL.: 364/401

## II. FIELDS SEARCHED

Minimum Documentation Searched <sup>7</sup>

Classification System

Classification Symbols

U.S. CL.

364/401,405; 235/375,383; 283/51,56

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched \*

## III. DOCUMENTS CONSIDERED TO BE RELEVANT \*

Category *	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
Y, &	US, A, 4,723,212 (MINDRUM ET AL.) 02 February 1988. See the entire document. (Member of same patent family as instant PCT application)	1-13
Y	US, A, 4,825,045 (HUMBLE) 25 April 1989, See the entire document.	1-13
Y	US, A, 4,833,308 (HUMBLE) 23 May 1989, See the entire document.	1-13
Y, &	US, A, 4,910,672 (OFF ET AL.) 20 MARCH 1990, See the entire document. (Member of same patent family as instant PCT application)	1-13
Y, P	US, A, 5,056,019 (SCHULTZ ET AL.) 08 October 1991, See the entire document.	1-13
Y	Patent Abstracts of Japan, Vol. 8, No. 211, Group No. P303, 30 May 1984, Abstract No. 59-94166, TAKAHASHI, See the entire document.	1-13
Y	Patent Abstracts of Japan, Vol. 9, No. 44, Group No. P337, 20 October 1984, Abstract No. 59-184965, SHIYUDOU, See the entire document.	1-13

\* Special categories of cited documents: <sup>10</sup>

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

## IV. CERTIFICATION

Date of the Actual Completion of the International Search

27 MARCH 1992

Date of Mailing of this International Search Report

18 MAY 1992

International Searching Authority

ISA/US

Signature of Authorized Officer

DAVID HUNTLEY

**FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET**

A	US, A, 3,959,624 (KASLOW) 25 May 1976, See the entire document.	1-13
A	US, A, 4,908,761 (TAI) 13 March 1990, See the entire document.	1-13
A	US, A, 4,949,256 (HUMBLE) 14 August 1990, See the entire document.	1-13
A	PR Newswire, Dialog Accession No. 0225527, 16 June 1989, "Catalina Marketing Corp. Out- maneuvers Citicorp POS", See the entire document.	1-13

**V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE<sup>1</sup>**

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers \_\_\_\_\_, because they relate to subject matter<sup>1,2</sup> not required to be searched by this Authority, namely:
  
2. ☐ Claim numbers \_\_\_\_\_, because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out<sup>1,2</sup>, specifically:
  
3. ☐ Claim numbers \_\_\_\_\_, because they are dependent claims not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

**VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING<sup>1</sup>**

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.
2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:
  
3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:
  
4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

- ☐ The additional search fees were accompanied by applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

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